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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/972,606	10/05/2001	Jefferson YS Yang	LELI 3442	4594

321 7590 10/17/2003

SENNIGER POWERS LEAVITT AND ROEDEL
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EXAMINER	
ALEJANDRO, RAYMOND	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 10/17/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/972,606	YANG, JEFFERSON YS	
	Examin r	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) *11-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 8-10* is/are rejected.

7)☒ Claim(s) *5-7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *5 & 7* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I (claims 1-10) in Paper No. 9 is acknowledged. The traversal is on the ground(s) that "apparatus claims 1-10 and apparatus claims 11-15 are intrinsically related" and "the scope of the search would appear to be not merely overlapping but identical". This is not found persuasive because the particular search for elected claims 1-10 is not required for non-elected claims 11-15, that is, the search required for the anode stream recirculation system classified in class 429/25 is not particularly required for the diaphragm pump per se classified in class 417/474. As admitted by the applicants, the inventive concepts involve both the anode stream recirculation system for a fuel cell and pump itself for pumping fluid. However, since the restriction requirement has been treated as combination and subcombination, it is further noted that the inventions are distinct because the combination *i.e. the anode stream recirculation system* does not require the specific diaphragm pump (*as admitted by the applicant*), that is, the combination can use any other conventional pump such as a gear pump, a peristaltic pump and the like, and the subcombination has utility by itself or in other combinations, that is, the subcombination *i.e. the diaphragm pump* has the utility of pumping fluid as such and can be used in any application requiring fluid distribution or pressurized fluid supply. Accordingly, serious burden would be raised if the search of both different inventions was made as required for the separate and distinct inventions.

The requirement is still deemed proper and is therefore made **FINAL**.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 05/09/03 (paper # 5) and 09/18/03 (paper # 7) was considered by the examiner.

Drawings

4. The sheets of drawings filed on 10/05/01 have been accepted.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1-3 and 9 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 and 8-9 of copending Application No. 09/938959 (*Patent Application Publication US 2002/0150801*) in view of Edlund et al US 2002/0119353.

The copending application'959 claims the following (CLAIMS 1-3 and 8-9):

1. An anode stream recirculation system for a fuel cell, the fuel cell including an anode gas input and an anode gas output, the anode stream recirculation system comprising:

an anode gas supply, providing the anode gas required for reaction of the fuel cell;

a switch connected with the anode gas supply;

a regulating device connected between the switch and the anode gas input of the fuel cell;

a sensor connected with both the anode gas output of the fuel cell and the switch; and

a humidifier connected between the anode gas output and anode gas input of the fuel cell, thereby forming an anode gas recirculation:

2. The anode stream recirculation system for a fuel cell according to claim 1, wherein the anode gas is hydrogen.

3. The anode stream recirculation system for a fuel cell according to claim 1, wherein the switch is an electromagnetic valve.

8. The anode stream recirculation system for a fuel cell according to claim 1, further comprising two check valves with one provided between the anode gas input of the fuel cell and the humidifier, and the other provided between the anode gas output of the fuel cell and the humidifier.

9. The anode stream recirculation system for a fuel cell according to claim 4, wherein the regulating device controls the pressure of the anode gas out of the anode gas supply into the fuel cell to a value substantially equal to the first predetermined value.

The copending application'959 claims the foregoing subject matter as recited in claims 1-3 and 8-9. However, the copending application'959 does not claim the particular diaphragm pump therein.

Edlund et al discloses a fuel cell system comprising a fuel cell, a fuel processor that produces hydrogen (ABSTRACT) and a dual-head pump 350 including a diaphragm pump or a piston pump (SECTION 0041/FIGURE 7).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the particular diaphragm pump of Edlund et al in the anode stream recirculation system of the copending applicaton'959 as Edlund et al teach that a dual-head pump

such as a diaphragm pump supplies gas by providing a pumping rate determined by the displacement of the respective cavity in the dual-head pump, and thus, a ratio of the displacement volume of the supplied fluid would be essentially constant over the entire range of delivery rates achievable with said pump since this ratio is fixed by the displacement volumes of each of the two pump heads and both pump heads are driven at the same speed by the same drive motor. Hence, the diaphragm pump allows to provide a constant volume rate of delivered gas.

This is a provisional obviousness-type double patenting rejection.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-2, 4 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art of the application 09/972606 (hereinafter referred to as "*the AP-ART'606*") further in view of Edlund et al 2002/0119353.

The present application is directed to an anode stream recirculation system wherein the disclosed inventive concept comprises the specific diaphragm pump use therebetween. Other limitations include the anode gas; the specific valves; the specific pump features; the pump opening; and the water inlet/outlet of the pump.

With respect to claims 1-2 and 8:

The AP-ART'606 teaches an anode stream recirculation system comprising an anode gas supply 40, a pressure regulator 42, and a hydrogen pump 44 between the anode gas output and the anode gas input (SECTIONS 0008-0009/FIGURE 4).

[0008] One conventional gas supply system for use in a fuel cell comprises: a cathode gas supply system (such as an oxygen supply), and an anode circulation system (such as a hydrogen circulation system), as illustrated in **FIG. 4**. Atmospheric air may serve as a supply of the oxygen supply system **30**, where air is filtered by a filter **32** and than pumped into the fuel cell **50** through a blower **34**. Excessive air, upon reaction within the fuel cell **50**, is discharged through a water recuperator **36**. The water recuperator **36** may recuperate the minute amount of water contained within the discharged air, where the water is then directed to a cooling system **38**. The useless heat generated by the fuel cell **50** is also transmitted to the cooling system **38**. The coolant used in the cooling system **38** then re-enters the fuel cell **50** to provide sufficient cooling thereto.

[0009] The conventional anode circulation system includes: a hydrogen source **40** which regulates hydrogen input through a pressure regulator **42**; a hydrogen pump **44** being provided at the other end of the fuel cell **50** for discharging excessive hydrogen, upon reaction within the fuel cell, and for pumping the hydrogen source **40** into the fuel cell **50**. The excessive hydrogen is discharged through a humidifier **46**, such as a bubbler, for increasing the humidity of the excessive hydrogen, then flows back into the piping of the hydrogen supply to be mixed with fresh hydrogen, and then repeats the same circulation. The water within the cooling system **38** can be transmitted to the water within the humidifier **46**

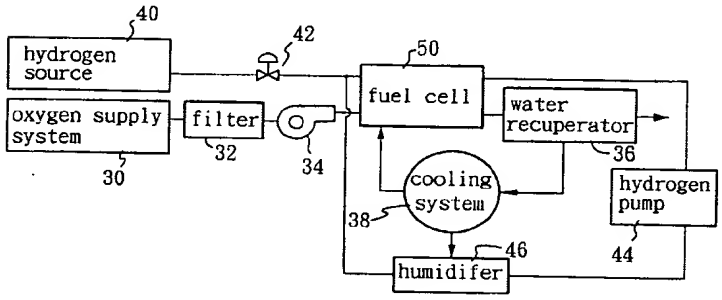

FIG. 4
(PRIOR ART)

The AP-ART'606 discloses an anode stream recirculation system according to the afore-described aspects. However, the AP-ART'606 does not disclose the specific diaphragm pump; the specific switch; the specific check valves and the water inlet/outlet of the diaphragm pump.

With respect to claim 1 and 4:

Edlund et al discloses a fuel cell system comprising a fuel cell, a fuel processor that produces hydrogen (ABSTRACT) and a dual-head pump 350 including a diaphragm pump or a piston pump (SECTION 0041/FIGURE 7). *It is noted that the specific pump features i.e. the wall, the interior space, the piston, the diaphragm assembly and respective structures are inherently disclosed by Edlund et al as Edlund et al disclose dual-head pump including either diaphragm pump or piston pump. Accordingly, Edlund et al's diaphragm pump or piston pump must exhibit substantially similar characteristics.*

Edlund et al also teach the use of valves 62 and 42, and a pressure regulator 40 wherein the valves and the pressure regulator are connected with the anode gas supply (SECTION 0027 and 0024). **Figure 7** below illustrates these features.

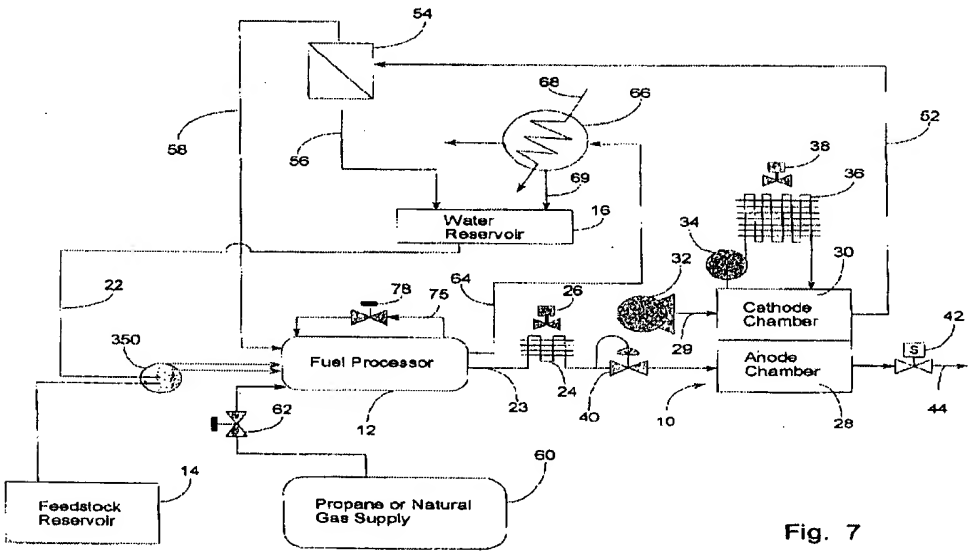

Fig. 7

With respect to claim 9:

Edlund et al teach the use of valves 62 and 42, and a pressure regulator 40 wherein the valves and the pressure regulator are connected with the anode gas supply (SECTION 0027 and 0024). As illustrated in **Figure 7** above, in particular, valve 62 is provided upstream of the anode

gas input, valve 42 is provided downstream of the anode gas output, and pressure regulator 40 is also provided upstream of the anode gas input.

With respect to claim 10:

Edlund et al teach the dual-head pump 350 supplies both feedstock from reservoir 14 and feed water from reservoir 16 (SECTION 0041). *Thus, the dual-head pump of Edlund et al comprises respective water inlet and outlet and an interior space filled with water and in communication with a water circulation system* (SEE FIGURE 7).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the particular diaphragm pump of Edlund et al in the anode stream recirculation system of the AP-ART'606 because Edlund et al teach that a dual-head pump such as a diaphragm pump supplies gas by providing a pumping rate determined by the displacement of the respective cavity in the dual-head pump, and thus, a ratio of the displacement volume of the supplied fluid would be essentially constant over the entire range of delivery rates achievable with said pump since this ratio is fixed by the displacement volumes of each of the two pump heads and both pump heads are driven at the same speed by the same drive motor. Hence, the diaphragm pump provides a constant volume rate of delivered fluid.

As to the specific switch (*the valve*) and check valves, it would have been obvious to one skilled in the art at the time the invention was made to use the specific switch (*the valve*) and check valves of Edlund et al in the anode stream recirculation system of the AP-ART'606 because Edlund et al teach that the specified switch and valves ensure the pressure of the hydrogen supplied to the anode chamber of the fuel cell remains at an acceptable value. Thus, it

provides a periodic adjustment of the supplied hydrogen in the anode gas supply by regulating the flow of hydrogen or fuel being fed to the fuel cell system.

As far as the water inlet/outlet of the diaphragm pump, it would have been obvious to one skilled in the art at the time the invention was made to use the diaphragm pump having the water inlet/outlet of Edlund et al in the anode stream recirculation system of the AP-ART'606 because Edlund et al disclose that diaphragm pumps are dual-head pump which are able to supply both the anode gas and water so as to maintain a satisfactory pumping rate which is essentially constant over the entire range of delivery rates. This is achievable because the displacement volume ratio of the dual-head pump is fixed by the displacement volumes of each of the two pump heads and both pump heads are driven at the same speed by the same drive motor. Thus, the diaphragm pump provides a constant volume rate of delivered fluid.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art "*the AP-ART'606*" in view of Edlund et al'353 as applied to claim 1 above, and further in view of Tanaka et al 6536551.

The admitted prior art "*the AP-ART'606*" and Edlund et al'353 are both applied, argued and incorporated herein for the reasons above. In addition, the foregoing references do not disclose the electromagnetic valve.

Tanaka et al disclose a hydrogen using system comprising first and second electromagnetic valves (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use electromagnetic valve of Tanaka et al in the anode stream

recirculation system of both the admitted prior art "*the AP-ART'606*" and Edlund et al'353 because Tanaka et al disclose the electromagnetic valve can be provided in the anode gas supply line to electromagnetically control portions of the hydrogen using systems. That is, when hydrogen control is required, the electromagnetic valves can be operated (closed or open) based on detection signals from a sensor, thereby, further flow control and improved safety of the system is obtained.

Allowable Subject Matter

10. The following is a statement of reasons for the indication of allowable subject matter: a reasonable search for the prior art failed to reveal or fairly suggest what is instantly claimed, in particular: the specific diaphragm pump features as recited in claim 5.

11. Claims 5-7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (703) 308-2383. The fax phone numbers for the

organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro
Examiner
Art Unit 1745